Rejection Under 35 U.S.C. § 103

Claims 1, 3-4, 6-7, and 11 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Adams in view of Hautau and Predhome Jr. Claim 1 has been amended for clarification, and Claims 3, 6, and 11 have been canceled without prejudice.

The Examiner states: The cam mechanism of Predhome Jr is exactly alike the claimed cam mechanism. Absent any claimed strength of structure used, this argument carries no weight. Applicant respectfully traverses the Examiner's statement as follows:

Claim 1 as amended herein recites: (a) the plate, the cam cylinder with the groove, the support cylinder with the cam follower, and the rotary actuator are co-axial, (b) the groove spirals around substantially one circumference of the cylinder, (c) the groove comprises (I) an upper horizontal section for locking the plate at the upper position, where the cam follower is securely locked in the cam groove, (II) a lower horizontal section for locking the plate at the lower position where the cam follower is securely locked in the cam groove, (III) a straight middle section for moving the plate at a fixed rate, (IV) an upper transition section connecting the upper horizontal section and the straight middle section for moving the plate at a rate lower than the fixed rate, and (V) a lower transition section connecting the lower horizontal section and the straight middle section for moving the plate at a rate lower than the fixed rate, wherein the length of each section in a horizontal direction is (I)<(IV)<(III)>(V)>(II).

In the above, all features (a), (b), and (c) are specifically designed for high load movement with high accuracy.

With regard to feature (a), this configuration is the most effective to transmit power from the actuator to the cam mechanism (minimum loss of energy). In contrast, in Predhome, power is transmitted to the cam mechanism (vertically disposed) via the shaft having a horizontal axis (28) using the groove (30) and the busing (46). In this non-co-axial configuration, it is apparent that energy loss is significant, and heavy load cannot be supported. Further, in Hautau, in the cam mechanism, the actuating rod (102) is not co-axial with the input shaft (64). Furthermore, in Hautau, because vertical movement is accomplished by the single actuating rod (102), it is impossible to support heavy load.

With regard to feature (b), the most effective way to transmit power to support high load is to form a groove around one full circumference of the cylinder so that the angle α can be lowest in order to elevate the plate to the same height. If the groove spirals around only a half of

the circumference, the angle α must be shaper, and thus more power will be required to elevate the pate to the same height. In Predhome, as shown in Figure 7 and column 4, line 46, a groove is formed around less than a half of the cylinder (120°), and it cannot be suitable for high load movement. Further, in Hautau, the groove (116) does not spiral, but waves (the groove is continuously formed around the cam member), and the cam member (114, 68) is constantly driven. Thus, in Hautau, the groove does not spiral around substantially one circumference of the cylinder. As with Predhome, this cannot be suitable for high load movement.

With regard to feature (c), the groove is configured to correspond to the rotation speed of the cylinder. That is, in the straight middle section, where the rotation speed is constant, the angle of the groove is also constant. Further, where the rotation speed is low, the angle is also low in the transition section. Where the rotation speed is zero, the angle is also zero in the horizontal section. The above configuration is significantly effective in supporting high load. Additionally, because the horizontal section is very short, the cam follower does not travel much in the horizontal section, and thus, the cam follower can be tightly fitted in the horizontal section (no idle clearance to smoothly move is required). The above configuration is significantly effective in securely seal the plate and the chamber. In the present invention, the apparatus's weight creates pressure downward, but a pressure difference creates pressure upward, and thus, the cam follower must withhold both upward and downward pressure (otherwise, a vacuum will not be maintained). The above configuration can accomplish this requirement. In contrast, in Predhome, the horizontal section is relatively long (Figure 5), and thus, the cam follower requires an idle clearance to move through the groove. In this configuration, the cam follower cannot be tightly fitted in the groove. In Predhome, no significant upward and downward pressure is created, and there is no need to accomplish securely locking the cam follower. In Hautau, because the groove is continuous, there is no concept of securely locking a cam follower. Further, in Hautau, in order to move the cam follower through the groove, the cam follower must not be tightly fitted in the groove.

In view of the forgoing, Claim 1 as amended herein could not be obvious over Predhome or Hautau or a combination thereof. The Examiner's above statement could not be justified.

Further, the Examiner states: Actual pressure or pressure differential is related to intended use and does not impart patentability. Also omission of an element with a corresponding omission of function is within the level of ordinary skill.

As described above, the patentability of the present invention does not reside in the intended use or simply omission of an element, and regardless of the Examiner's above statements, Claim 1 as amended herein could not be obvious over Adams and the other references, because no reference suggests a combination of elements, and no motivation can be found therein. Additionally, because Adams's divider has three plates, there are always three discrete compartments, and thus, a pressure difference is not great as compared with the present invention. In Adams, there is no need or no motivation to use a special structure for withholding a high pressure difference, such as the cam mechanism of the present invention. Further, the references do not discloses or teaches all the elements of Claim 1, and a combination of the references could not lead to Claim 1. The remaining claims are dependent on Claim 1, and at least for this reason, the remaining claims also could not be obvious over the prior art. Applicant respectfully requests withdrawal of this rejection.

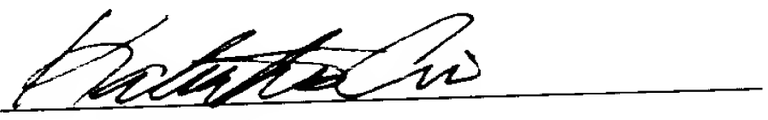
CONCLUSION

In light of the Applicants' foregoing Remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: April 9, 2003 By: 

Katsuhiro Arai
Registration No. 43,315
Agent of Record
Customer No. 20,995
(949) 760-0404

Appl. No. : 09/650,122
Filed : August 29, 2000

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 3, 6, and 11 have been canceled.

Claim 1 has been amended as follows:

1. (Thrice amended) A multi-chamber load-locking device for transferring wafers ~~between a first pressure area and a second pressure area~~, said device having an interior divided into (i) an upper chamber and (ii) a lower chamber, ~~both of which are for transferring wafers at the second pressure which is higher than the first pressure,~~ and (iii) an intermediate section located between the upper chamber and the lower chamber, which is for loading/unloading wafers ~~at the first pressure~~,

said device comprising (a) a single divider plate having an upper side and a lower side, both of which are for temporarily supporting wafers, said plate moving reciprocally between an upper position and a lower position, wherein the plate divides and seals the upper chamber from the intermediate section and the lower chamber at the upper position, and the plate divides and seals the lower chamber from the intermediate section and the upper chamber at the lower position; (b) a cylindrical cam structure co-axially connected to said plate, wherein said plate moves between the first position and the second position by rotation of the cylindrical cam structure; and (c) a rotary actuator for rotating the cylindrical cam structure,

said cam structure comprises (1) a cam cylinder having a cam groove which rotates with the rotary actuator, and (2) a support cylinder having a cam follower which support cylinder is attached to the plate and does not rotate, wherein the cam follower is fitted in the cam groove and moves vertically when the cam groove rotates, said support cylinder being provided inside the cam cylinder, wherein the plate, the cam cylinder, the support cylinder, and the rotary actuator are co-axial,

said groove spiraling around substantially one circumference of the cylinder, said groove comprising (I) an upper horizontal section for locking the plate at the upper position, where the cam follower is securely locked in the cam groove, (II) a lower horizontal section for locking the plate at the lower position where the cam follower is securely locked in the cam groove, (III) a straight middle section for moving the plate at a fixed rate, (IV) an upper transition section connecting the upper horizontal section and the straight middle section for moving the plate at a rate lower than the fixed rate, and (V) a lower transition section connecting the lower horizontal

section and the straight middle section for moving the plate at a rate lower than the fixed rate, wherein the length of each section in a horizontal direction is (I)<(IV)<(III)>(V)>(II)~~wherein~~

~~when the plate is at the upper position, the plate divides and seals the upper chamber from the intermediate section and the lower chamber, wherein the upper chamber is at the second pressure, as a second pressure space, while both the intermediate section and the lower chamber are at the first pressure, as a first pressure space, to cause a pressure difference exerting downward force on the plate, the cam follower being configured to be locked in the cam groove to withstand the downward force on the plate, whereby wafers at the upper side of the plate are transferred between the first pressure area and the second pressure area via the upper chamber,~~

~~and~~

~~when the plate is at the lower position, the plate divides and seals the lower chamber from the intermediate section and the upper chamber, wherein the lower chamber is at the second pressure, as a second pressure space, while both the intermediate section and the upper chamber are at the first pressure, as a first pressure space, to cause a pressure difference exerting upward force on the plate, the cam follower being configured to be locked in the cam groove to withstand the upward force on the plate, whereby wafers at the lower side of the plate are transferred between the first pressure area and the second pressure area via the lower chamber,~~

~~wherein at both the higher and the lower positions of the plate, the first pressure space is larger than the second pressure space in the interior of the device~~.